Notebook, N-88-03-06

The dated entries in this notebook cover the periods March-May 1888 and December 1891-January 1892. At the front of the book are transcriptions of phonograph cylinder experiments conducted by Arthur C. Payne in 1888. From the back of the book forward are notes and calculations by Joseph W. Harris regarding various chemical analyses. Included are notes on ore assays; on a "new method of nickel determination"; and on the search for a substitute for borax, conducted for the Edison Phonograph Works. The front cover is labeled "520." The inside front cover is inscribed "Mr Payne Sepr 3 - 88 #520." The back cover is labeled "Qualitative Analysis Only. Harris." The pages are unnumbered, and several pages have been removed from the book. Approximately 160 pages have been used.

N-88-03-06

M Payne

Sept 3-88

#520

#1

Soluble in Lap Kali
Neutral reaction
Sodium 7 Cases.
Recognize Sodium acetate

#2

a chlorinated Substance.
Sol. in water. Barium Chloride Tes
neutral reaction " "
color, shaw yellow. Phosphorous

#3 a white Substance
Potassium 7 Cases,
Soluble in H_2O.
neutral reaction
Soluble in dilute H_2SO_4

#4 Reddish crystalline material
Easily melted in flame burns with a yellow flame, give off white vapors.
Melts on heated ~~[illegible]~~ H_2SO_4 leaves red Oil drops, melting in flame, to a light green colored ~~[illegible]~~ liquid.
Insoluble in cold H_2O, same effect on heated water, acid on H_2SO_4 slightly quick reaction.
(See Plan)

#5 Organic Compound.
~~Has a garlic Odor.~~
(see Next Page)

#5 (continued) ~~[illegible]~~ burns, give off inflammable vapors, brown
Slightly soluble in cold Alcohol
very Sol. in heated "
very Sol. in cold Ether,
Insoluble in cold H_2S water.
forms Oily drop in Hot H_2S water
In Sol. in cold Barium Chloride Sol.
forms Oil drop in pot.
~~Crystallizes out on high temp.~~

#5 Organic Compound.
Has a garlic odor,
Insol. Cold alcohol
" Hot "
" Cold Ether
" Hot Ether,

#4, melters at a high temp. and condenses at a dull red heat to a white solid, slightly ~~not~~ transparent, crystalline, hard ~~Ore~~

Fair - imitation of White Wax & Car.

#9. - brittle & very scratchy.

3/5/88.

Cerasine — = 100
Carnauba — = 80
Castor Oil = 10 drops = 480 mg.

Cerasine — = 100
Carnauba — = 80
Castor Oil = 40 drops = 1920 mg.

Cerasine — = 100
Carnauba — = 80
Castor Oil = 130 drops = 6240 mg.

#5 (continued)

Sol. Bain Chloride Cold

" " Hot

" cold H_2SO_4 neutral

" Hot " "

" Sulphate Soda 1145

" Hot " "

Ash Black.

#6 Red Powder

Iron flame, effervesces and jumps from holder!

Soluble in concentrated H_2SO_4

Boiled with caustic soda, boils and gives off vapors.

H_2SO_4 changes color to a dirty green

Chlorine precipitate floats

Dilute H_2SO_4 changes the color

6/7/[illegible]

Cerasine = 100
Carnauba = 50
Castor Oil = 10

Cerasine = 100
Carnauba = 75
Castor Oil = 50

Cerasine = 100
Carnauba = 100
Castor Oil = 50

Cerasine = 100
Carnauba = 200
Castor Oil = 50

#6 (continued)
On boiling Dried Orange yellow
dissolved in H_2O gave a
green & yellow solution.

#7 a light brown Powder
gives off dense white vapors when
heated, leaves a black ash.
melts and sublimes at a high
temperature.
slightly sol. in cold dilute H_2SO_4
more " boiling " "
slightly sol. in cold H_2O
more in boiling "
very slightly sol. in Ether, produces
a reddish purple color.
very slightly sol. in alcohol
Contains Chlorine
neutral reaction
slightly sol. in H_2SO_4 conc.
Slightly sol. in Barium Chloride Solution
Sol. in strong HNO_3 cold
" " " " Hot, produces

3/8/04

Yellow Ozokerite = 100
Carnauba = 30

Yel. Beeswax = 100
Carnauba = 40

Crude Japan Wax = 100
Cerasine = 100
Carnauba = 60

Yellow Ozokerite = 100
" Beeswax = 100
Carnauba = 70

Yellow Ozokerite = 100
White " " = 100
Carnauba = 80

H7 (continued)
chiefly crystally colored solution.

H7
Whole Powder,
Sodium flame,
soluble in reaction, neutral reaction
less sol. in Hot water
contains chlorine,
soluble in dilute HNO_3, Hot & cold
insol. in Ether
very slightly sol. in Hot & cold
alcohol
insol. in H2 Sucrose
very slightly sol. in Hot & cold
Benzin chloride.
Soluble in strong HNO_3, deoxidizes it,
the Nitric acid

Probably a silicate of Soda

8/9/88.

Paraffine = 100
Carnauba = 80
alpha Naphthol = 4

Yellow Glycerite = 100
Carnauba = 50
Castor Oil = 10

Yellow Glycerite = 100.
Carnauba = 70
Castor Oil = 50

Yel. Glyc. — = 100
Carnauba = 100
Castor Oil = 50

Yel. Glyc. — = 100
Carnauba = 200
Castor Oil = 50.

Hg

A very crystalline substance

Sol. in water,

probably neutral reaction, difficult to prove, on account of color

Slightly sol. in dilute H_2SO_4.

Potassium flame,

Sol. in Hot Nitric acid -

Potassium Permanganate

H10

A white crystalline substance

Sodium flame,

Alkaline reaction,

Soluble in water contains chlorine,

" in dilute H_2SO_4, more so when heated

3/10/88

Yellow Oxykerite = 100

Carnauba = 80.0

Castor Oil = 0.0

Yel. Ozk. = 100

Carnauba = 40.0

Castor Oil = 0.0

3/16/88

Ceresine — = 100

Carnauba - = 100.

Caustic Potash = 3

[Ceresine 100 + (Car. 50 + KOH. 40 + C_2H_5O. 50) 20] = 100

∴ Carnauba = 80

Ceresine (residue by ether extraction) = 100

Carnauba = 15

Good – hard – no scratch – little sticky
N.B – affinities found to be caused by the
Electrical properties.

Good – hardness – no scratch –
good talk – still sticky –
(Electrical.)

Cerasine = 100
Carnauba = 80
Metallic Sodium = 1½

"

3/28/88.

Syrian Asphalt = 100
Carnauba = 100
Crude Japan Wax = 60

"

Syr. Asphalt = 100
Carnauba = 100
Crude Jap. Wax = 25

"

Syr. Asphalt = 100
Carnauba = 125
Crude Jap. Wax = 60.

"

Syr. Asphalt = 100
Carnauba = 100
Hulu Beeswax = 90.

Not a good mixture.

Well strained - mixture better.

Good - cuts well but shade too soft - not very electrical - talks well but has slight scratch - somewhat rotten + brittle.

very Good - harder - but more electrical - good talk - still brittle.

Too soft + rotten.

4/4/PF

Carnauba = 100
Coal Tar = 40

"

Carnauba = 100
Coal Tar = 40

"

Carnauba = 100
Coal Tar = 20
Crude Jap. Wax = 20

"

Carnauba = 100
Coal Tar = 20
Crude Jap. Wax = 10

"

Carnauba = 100
Crude Japan = 25
Coal Tar = 20

Good - good bath - no scralit + good cut - but - electrical.

Shade bitter

4/5/88.

Carnauba = 100
Crude Japan = 10
Coal Tar (strained) = 20

Carnauba " = 100
Crude Japan = 5
Coal Tar (strained) = 20.

Carnauba " = 100
Crude Japan = 15
Coal Tar (St.) = 15

Sipian Asphalt = 100
Crude Japan = 80

Sip. asphalt " = 100
Crude Japan = 100
Carnauba = 100

#11
A white powder
Insol. in water
very slightly sol. in hot water
sol. in Ether
Slightly sol. in cold Alcohol
More so in hot "
difficultly fusible, leaves a yellow
greenish colored slag, resembling glass
eventually sublimes.
Charges with H_2S water to a black powder
insoluble in it.
very slightly sol. in Barium chloride
turns to a dirty white powder.

#12 A white powder,
does not burn in flame,
fuses at a very high temperature and
sublimes again on cooling, but not the
same material.
dissolves with difficulty in dilute HCl &
the precipitate is held in solution.
C. P. H_2SO_4 liberates small bubbles of gas

Carmanta	—	100
Cerasin	—	30
Syp. asphalt	—	20

Cerasin	—	100
Carmanta	—	60
Coal Tar (purified)	—	10

Cerasin	—	100
Carmanta	—	25
Syp. Asphalt	—	5

Paraffin	—	100
Carmanta	—	40
Alpha Naphthol	—	5

Paraffin	—	100
Carmanta	—	50
Alpha Naphthol	—	5

Paraffine — 100
Carnauba — 75
alpha Naphthol — 5

Gum Hamar — 100
White Wax — 100

Gum Hamar — 100
Paraffine — 100

4/14/88

Cylinder — 100
Carnauba Compound 50
Gutta percha — 23 No. 2.

Ceresine — 100
Carnauba — 145
Gutta percha — 25

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very good - beautiful cut - continuous shaving - good lath - hard + non-electrical.

adopted as a reg. cylinder - No. 2. 4/15/88

185
1155
950
585
3650

23
75.75
585
585 ; 23 : 100 %
585) 2300.000 (3.9326
1755
5450
5265
185

#12 (continued)

Insoluble in HNO_3, gives off bubbles of a gas.

Insol. in H_2SO_4 acidified, gives off bubbles of a gas. changes to a black powder

(This gas is probably Air)

Fuses with difficulty at a high temp.

Fused mass unaffected by HNO_3

" gives off white fumes when heated.

" " H_2SO_4 cold

Unaffected by HCl cold

" " " hot, but shrinks the mass.

" " HNO_3 hot.

#13 a reddish brown powder.

does not fuse at a red heat, but seems to form a different compound.

changes at a very high temp. to an purple powder.

HNO_3 gives off a light vapor when in contact with the residue.

H_2SO_4 does not affect it cold, but when hot changes its color to a light purple, and gives off dense vapors. (the residue)

Strong sodium flame,

Unaffected by dilute H_2SO_4

heated, gives off vapors + water with it.

These vapors may be due to sulphur in H_2SO_4, as a sample of it gave the vapors. C.P. H_2SO_4 acts the same.

unaffected by cold HCl., heated gives off vapor, and changes the nature of the powder. Turns reddish purple in color.

Unaffected by H_2S under H.T or cold

" " Barium Chloride H.T or cold.

" " cold Ether, very slightly

Sol. in Hot Ether.

Sv. sol. in cold Alcohol,

" " " Hot

Sv. sol. in H_2O, Neutral reaction.

#14 White Powder,

Potassium flame

When heated, sputtered out in long tails,

like #6. Sublimes at a high temp.

sublimes even when heated slowly

#14 (Continued)

Nitric Acid does not affect it, but on heating fuses not spread, and turns to a black mass. fuses & ~~sublimes~~ sublimes on further heating.
unaffected by HCl acid, at a high temp. turns orange yellow. still higher temp, sublimes
soluble in H_2SO_4, on heating, boils & sublimes leaves a white amorphous mass behind, heating still further, sublimes.
Insol. in dilute H_2SO_4.
" " H_2O. Hot or cold.

H_2S water changes it to a darker color.
Unaffected by Barium chloride, Hot or cold.

Caustic soda changes it to a black compound.

Insol in Ether
" " Alcohol cold or hot.

changes to a yellow when burned on charcoal by a blowpipe.

#15 a white powder.
Potassium flame.
slightly sol. in water after some time, potas. again on heating.

3/3/98

Camauta –	100
Hamar Varnish –	20
Camauta –	100
Hamar Var. –	20
Camauta –	100
Hamar Varnish –	40
Camauta –	100
No 1 Polishing Varnish –	10
Camauta –	100
No 1 Pol. Var. –	20
Camauta –	100
No 1 Pol. Varnish –	40

H.5 (continued)

soluble in dilute H_2SO_4.

solubility increased on heating.

sol. in caustic soda, upon heating with caustic soda on pt. spoon, gives off a little gas and a metallic pt. spoon with all different shades. This coloring matter dissolves and dissolves in NaOH sol., but on heating again turns green.

Dissol. in sol. HCl produces a yellow green liquid on heating.

Slightly sol. in sol. HNO_3, heated gives off a gas, [illegible] a white mass, which is partially [illegible] same powder on heating on pt. spoon, powder sublimes and turns a yellow green color. (Pure powder)

$$\begin{array}{r} 6.5 \\ 3.8 \\ \times 6 \\ \hline 18 \\ 36 \\ \hline 21.8 \end{array}$$

$$\begin{array}{r} 30.3 \text{ mg} \\ \times 6.5 \\ \hline 151.5 \\ 181.8 \\ \hline 196.95 \\ \times 5.8 \\ \hline 1137.1 \end{array}$$

Camauta — 100
White Japan Varnish — 10

Camauta — 100
White Jap. Var. — 20

Camauta — 100
White Jap. Var. — 40

Camauta — 100
Brown Jap. Var — 10

Camauta — 100
Brown Jap. Var. — 20

Camauta — 100
Brown Jap. Var — 40.

Composition of materials put in small fuse plugs.

1 100 parts plaster Paris, 6 parts soda nitrate, mixed with H_2O

2 100 parts fire clay, 4 parts lead chromate

3 100 parts fire clay, 100 parts chlorinated oil

4. 100 parts fire clay 100 parts crude chlorinated napthalene

5 100 parts fire clay, 50 parts chlorinated napthalene

6 100 parts fire clay 25 parts chlorinated napthalene

7 100 parts fire clay, 25 parts chromium chloride

8. Insulation

9 Earlier Insulation

Carnauba — 100
Furniture Varnish — 10

Carnauba — 100
Fur. Var. — 20

Carnauba — 100
Fur. Var. — 40

Carnauba — 100
Black Asphalt Var. — 10

Carnauba — 100
Black Asp. Var. — 20

Carnauba — 100
Black Asp. Var — 40

Carnauba — 100
Elastic Oil Finish — 10

Carnauba — 100
Elas. Oil Fin. — 20

Carnauba — 100
Elas. Oil Fin. — 40

Carnauba — 100
Pale Coach Body Var. 10

Carnauba — 100
Pale C. Body Var. — 40

Weight of components of insulation

$PbCO_3$ 298 grams.

Weight of dish and insulation 726.

Weight of dish 293 grams

Weight of chlorinated oil 135 grams

% $PbCO_3$, 68.815

% Oil, 31.185

To generate chlorine, use

370 grams manganese and 900 grams HCl.

298	
+ 428	
726	
293	
433	
135	
433	
298	
135	
679.2	

Carnauba — 100
Superior No. 1 Coach Var. — 10

Carnauba — 100
Ship. No. 1 Coach Var — 40

Carnauba — 100
White Copal Varnish — 10

Carnauba — 100
White Copal Varnish — 40

Carnauba — 100
Spar Composition — 10

Carnauba — 100
Spar Composition — 40

With Carnauba as a base (100 parts)
used the following substances in the
proportions of 10 parts & 40 parts: —

Extra Brown Shellac Spirits: —
No 1 Polishing Varnish: —
No 1 Furniture Varnish: —
Diamond Coach Varnish: —
No 1 Coach Varnish — : —
White Shellac Spirits.
No 1 Preservative.
Extra Polishing Varnish.
Brown Shellac Spirits.
No 2 Preservative.
Hamar Varnish.
Black Leather Varnish.

Weights & measures, Mole & oil
11.2 grams.
200 grams Ammonia Hydrate.
1250 " Oleic.

5562
2.39
50.58
16686
11.24
1329.8

7.5) 40.602 (5362
37.5
3.02
1.50
1.52

With Cassauba as a base (100 parts) used the following substances in the proportions of 10 parts + 40 parts:—

Aniline Brown.
" " Black.
" " Gray.
" " Cochin.
" " Orange.
" " Fuchsin.
" " Blue.
" " Chloride.

With Cannabis as a base (100 parts) used the following substances in the proportions of 10 parts & 40 parts:—

Oil Spruce
" Cubebs
" Paraffin
" Turpentine
" Lard
" Mustard Seed.
" Linseed.
" Sperm
" Palm
Cocoa Butter,
Lanolin.
Lard.
Tallow
Venice Turpentine
Vaseline.

Also used Spirian Asphalt as base (100 parts).

With Cannula as base (100 parts) used the following substances in proportions of 10 parts to 40 parts:-

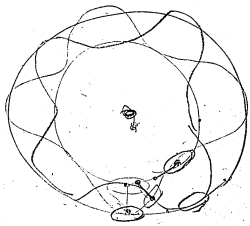
Gum Kino	Gum Myrrh.
" Bdellium.	" Thus.
" Myrrh.	" Olibanum
" Tinc	" Sanguis Draconis
" Ladanum	" Amalgam
" Sandarac	" Asafoetida
" Benzoin	" Benzoe
" Gamboge	" Scillae
" Almadina	" Shellack
" Ammoniac	Kauri.
" Hemar	Benzoe
" Mastic	Guiac.
" Arabic	Guttae.
" Amine	
" Elemi	
" Chile	
" Euphorbium	

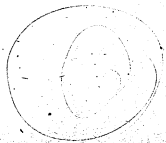
With Carmanta as base (100 parts) used following substances in the proportions of 10 parts to 40 parts:—

Benzoic Acid
Formic " "
Picric " "
Oleic " "
Tartaric " "
Gallic " "
Picric " "
Ammonia
Caustic Potash,
" Soda
Cyanide Potash.
Chloral Hydrate
Stannous Chloride
Syrian asphalt.
Iodine
Ammonium Sulphide
Sulphur.
Stearic Acid

Naphthalin,
alpha Naphthol,
Coal Tar Creosote
Carbolic Acid:
Camphor.

Also used Syrian asphalt as base (100 parts)





Carnauba — 100
Resorcin — 5
Caustic Potash — 2

"

Carnauba — 100
Resorcin — 20
Caustic Potash — 15

"

Carnauba — 100
Crude Japan Wax — 20

"

Carnauba — 100
Crude Japan Wax — 40

"

Syrian asphalt — 100
Crude Japan Wax — 5

Syrian asphalt — 100
Crude Japan Wax — 10

Syrian asphalt — 100
Crude Jap. Wax — 100

Syrian asphalt — 100
Crude Jap. Wax — 50

Syrian asphalt — 100
Crude Jap. Wax — 20
Naphthalin — 20

Syrian asphalt — 100
Ceresin — 20
Naphthalin — 10

Syrian asphalt — 100
Arsenic — 20
Naphthalin — 40

Syr. asphalt — 100
Arsenic — 20
Chloral Hydrate — 10

Syr. asphalt — 100
Arsenic — 20
Chloral Hydrate — 40

Yellow Ozokerit - gave some fair results with 20 parts Jel. Osk - too brittle - with 40 parts, still too brittle - gave a powdery cut + dull scrape - with 60 parts Jel. Osk. gave very good results; only slightly sticky. Int. Paint good shiny cut + scrape, + a point - scrape looking very smooth under the microscope.

Yellow Beeswax - acted similar to Jel. Osk, but on whole not quite as good.

Black Ozokerit - - Chemical -

Cocoa Butter, - cut in small proportion softens the gum, but leaves it dry sticky. appears to dissolve.

Oleate - only the Lead Oleate would mix well, made beautiful cut + scrape, but very sticky.

5/1/08

With Gum Elemi as base (60 parts) used following substances in the proportions of 20, 40 + 60 parts:-

White Ozokerit:-
Yellow " " "
Black " " "
Yellow Beeswax:-
Crude Paraffin -
Crude Japan Wax
Paraffin.
Cera Japonica
White Wax
Spermaceti.
Resinate
Stearin
Cocoa Butter.
Gutta percha
Gum Zinc
" Aluminum
Asphaltum
Crude Petroleum
Creosote
Carbolic Acid,
Coal Tar.

alpha naphthol:-
Oleate of Lead
" " " Strontium
" " " Aluminum
" " " Zinc
" " " Copper
" " " Lead + Copper
Palmitate of Aluminum.

Hamar — 100
Yellow Oxide — 60
Spumach — 15

"

Hamar — 100
Yellow Oxide — 60
Ora Japonica — 15

"

Hamar — 100
Yel. Oxe. — 60
Crude Paraffin — 15

"

Hamar — 100
Yel. Oxe — 60
Lead Chlate — 5

"

Hamar — 100
Yel. Oxe — 60
Lead Chlate — 25

"

Hamar — 100
Yel. Oxe — 60
Lead Chlate — 15

1/

Hamar = 100 } = 100
Jl. Oph. = 65

Lead Oleate = 10

---

2) Hamar — 100
Lead Oleate — 50
Camauba — 10

---

3) Hamar — 100 = Composition = gives fair
Lead Oleate — 50 scraps from a print - but quite sticky

Composition — 100
Jl. Oph — 50

---

4) Composition — 100
White Wax — 50

---

5) Composition — 100
Oriental Japan Wax = 30

Composition = 100
Jel. Glyk = 40
Gum Thus = 40

Composition = 100
Crude Japan = 0

Composition = 100
Camauba — 10

Composition — 100
Jel. Glyk — 10

Composition — 100
Camauba — 25

Composition — 100
Jel. Glyk — 25

Composition — 100
Jel. Glyk — 20
Almedina — 20

Composition — 100
Jel. Glyk. — 20
Gum Balata — 20

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n.f.

Damar — 100
Lead Oleate — 50
Jel. Glyk — 20
Gum Almadina — 50

Damar — 100
Jel. Glyk — 65 = 100
Lead Oleate = 15

Gum Thus — 100
Oleate of Lead — 50

Soft.

Gum Thus — 100
Lead Oleate — 25

Perfect print scrape.

Lead Oleate — 100
Carnauba — 50 - 60 .. 70 + 80

Lead Oleate — 100
asphaltum — 40 .. 50 .. 60 .. + 70

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asphalt — 100
Lead Oleate — 10 + 25

Electrical

Rosin — 100
Lead Oleate — 10 to 50

Compounds Containing Slack
insulation & Sundry Waxes & Resins
Dec. 22-1891

# 1	Canada	10
	Insulation	90
# 2	Canadian	10
	Ins	90
# 3	White Bees Wax	10
	Ins	90
# 4	Japan Wax	10
	Ins	90
# 5	Assyrian asphalt	50
	Ins	50

the asphalt should be melted first and
ins. added while hot.

Quantities	of	weights
100	grams	1#
50	"	3/4 "
20	"	9/16 "
10	"	1/2 " ounce
5	"	3/8 "
(2) 2	"	1/4 " ounce
1	"	1/8 " fluid

#6	Aluminum Stearate	5
	Ins.	95
#7	Rosin	20
	Ins	80
#8	Stearic Acid	10
	Ins	90
#9	Paraffin	10
	Ins	90
#10	Ceresin	5
	Ins	95
#11	Gutta Percha	10
	Ins	90

With exception of Hamar & Mastix Thus, Chich, Almadina, the gums did not mix well – the majority not at all –

Hamar & Mastix gave best results.

With following gums as bases (100 parts) used Jel. Opiate in proportion of 60 parts –

Ammo	Guiac.
Tacamahac	Hemlock.
Thus.	Kino
Hamar	Bdellium.
Ammoniac	Myrrh.
Scillae	Tragacanth.
Sticklac	Chich.
Elemi	Almadina.
Mastix	Benzoin.
Sandarac	Arabic.
Kauri	Euphorbium.
Gamboge	Spruce.
Guttae.	Amalgam.
Olibanum	Assafoetida.
Sanguis Draconis	Boniac.
Ladanum.	
Copal.	

Made experiments with Kaolin, Plumbago, French Chalk, Precipitated chalk, mixed in all proportions with all the waxes & asphalts. - Found it hard to work - hard to keep from settling & N.G. as a talking surface.

Substitutes for Yel. Oyk. - White Wax - Japan Wax - Yel. Beeswax
Black Oxylands &c. but results not as good as with Yel. Oyk.

Hamar	—	100
Yel. Oyk	—	50
Cocoa Butter	—	10
Give fair results but shaving a little sticky.		
Hamar	—	100
Yel. Oyk	—	50
Cocoa Butter	—	20
More ~~sticky~~ & too soft.		
Hamar	—	100
Yel. Oyk	—	50
Cocoa Butter	—	15
Give good result - hard - smooth cut - smooth scrape - does not contract, & not sticky.		
Hamar	—	100
Yel. Oyk	—	65
Cocoa Butter	—	10
Too dry - powdery cut.		
Hamar	—	100
Yel. Oyk	—	65
Cocoa Butter	—	5

Weight of 12 carbon filaments
90.8 mg.

Weight of 19 carbon filaments 147.65 mg.
" " 19 " " 146.8
" " 19 " " 143.85 mg.
" " 19 " " 141 "
" " 12 " " 88.8

Qualitative analysis of Unknown chemicals.

#1 Sodium flame.
Does not fuse.
Dark brown coloy after heating on platinum.
Is not sodium acetate.
Soluble in cold Hcl.
" " Hot "
" " cold HNO_3
" " Hot " "

Give off fumes like burnt hair when highly heated.
Residue unaffected by HNO_3 when cold.
" " " Hot " "
" " " Hcl cold
" changed to a colourless white mass when heated in hot Hcl.

July 14 - 1891.

H1 White crystals
soft
on heating in tube, gave off white fumes, having an odor of garlic, fumes ascended the air in the form in rings, ignited at the mouth of the tube condensed on the sides to a yellow ppt, while at the bottom became black (inside.
The fumes are heavier than air
material turned a light tawny color at the mouth of the tube, the ppt was a light red.

H 1.

White powder, heated in a small glass tube gives off dense vapors, which ignited with slight explosion at the mouth of the tube. Vapors are heavier than air, and condensed on the side of the tube, a yellowish ppt. The white powder expanded, and changed to a tawny color.

On heating red hot, changes immediately on cooling to a white powder, but after a minute, becomes a very light pink.

Unaffected by dilute H_2SO_4 on heating.

Heated on charcoal, vapors burn with a green flame, turns to very faint pink color

fuses with difficulty in the oxydizing flame of a blowpipe, to a hard white bead.

gives no color ~~to~~ when heated with cobalt nitrate; lead remains white.

Heated with sodium carbonate and a drop of water, in charcoal, gives garlic odor, leaves an incrustation on the charcoal of a pinkish color.

Fuses readily with sodium phosphate, after the fumes have been driven off.

forms a very faint pink colored bead.

on continued heating, forms an amethyst colored bead with a white streak in it (on cooling) on long continued heating, comes down to a clear amethyst blue bead.

Slightly soluble in cold water, more soluble in boiling water.

Completely soluble on continued boiling

Acid reaction.

no precipitate formed with HCl. even on boiling.

no precipitate formed with H_2S water after boiling ~~to~~ expel the H_2S a few drops HNO_3 were added and boiled, turned to a clear straw yellow color.

Immediately on addition of Ammonia a precipitate forms which filtrates and often dissolves in the solution

addition of $(NH_4)_2S$ produces a yellow ppt.

The ppt washed and put in a beaker with water + some H_2S, sp g 1.12 enough to dissolve the ppt.

no nickle, no cobalt.

dilute H_2SO_4 produces no ppt.

Some alcohol produced a slight cloudyness, but partially redissolved on addition of more alcohol.

dilute H_2SO_4 added to the alcohol produced a decided cloudyness.

no calcium

dried small quantity with HNO_3, added drop of $K_4Fe(CN)_6$, shamrock color.

Examination of #1, according to Page 338.

ppt is found by $(NH_4)_2S$, more by H_2S

Barium chloride produces a ppt which is not ~~readily~~ dissolved by Hcl.

the filtrate from the $(NH_4)_2S$ after boiling to expel the H_2S is ppt by Hcl.

the ppt. is washed into a beaker treated with $(NH_4)_2S$ heated by steam filtered,

Hcl added to filtrate, produces a white cloudy ppt.

Absence of metals of group 6

To the ppt from $(NH_4)_2S$ after heating with aqua regia, is heated in an evaporating dish with some HNO_3 (dilute 20%), a white ppt is formed.

no mercury.

no lead.

no bismuth

no cadmium

no Barium

no Strontium

H 9.

a red crystal, seems to be a chromium salt

Soluble in water.

acid reaction.

Heated in a glass tube melts in its water of crystallization, further heating gives a dark green deposit on the side of the tube which is not a sublimate.

When the dark is heated, fumes are given off which give an alkaline reaction.

Heated on charcoal, decrepitates. leaves a dark green powder, even with Na_2CO_3 fuses with difficulty to with sodium carbonate

bright green opaque residue

H_2S produces a ppt of the solution in water

H 10

a white alum crystal.

Heated in a small glass tube, dissolves in its water of crystallization, gives off vapors of ammonia.

very alkaline reaction.

On heating on charcoal with $NaPO_3$ gives a clear bead on cooling. While heating dissolves very readily in the water of crystallization very easily fusible

Readily soluble in H_2O

alkaline reaction.

HCl produces no ppt. gives off fumes of sm NH_4Cl.

absence of silver & (mercurous) mercury.

acid reaction.

H_2S produces no ppt.

solution is colorless.

no chromium

color not changed by HNO_3.

No ppt. when neutralized with ammonia

no ppt on adding $(NH_4)_2S$.
no ppt on adding ammonium carbonate,
ammonium .

[THIS BOOK WAS USED IN BOTH DIRECTIONS. THE FOLLOWING PAGES WERE FILMED FROM THE BACK END FORWARD.]

(See Page 482, Treseniu's Qualitative Analysis).

Analysis of Solution containing one metal only. Metal required.

#1 clear solution, neutral reaction

H_2O, no ppt. sol. light yellow, strongly acid.

H_2S a slight ppt which redissolves on further addition of H_2S. nearly colorless.

NH_4Cl (after boiling off H_2S) turns [illegible] a reddish brown color, and produces a ppt.

NH_4OH produces a heavy ppt, and makes the color deeper.

$(NH_4)_2S$ dissolves the ppt formed by NH_4OH, and turns the solution a deep yellow color.

on boiling; the color deepens
then suddenly turns a deep yellow
again, with the formation of a ppt.
The ppt has a straw yellow color.
It is insoluble in HCl.

Boiled off H_2S completely, added
H_2O, straw colored solution.
added HNO_3, color, orange yellow.
added NH_4OH, no ppt.
added $(NH_4)_2S$, ppt after standing
way some time.
filtered, ppt dissolved in very dilute
HCl.
had a dark color

according to page 491

HCl no ppt
H_2S no ppt
NH_4Cl, NH_4OH, $(NH_4)_2S$, no ppt
$(NH_4)_2CO_3$ no ppt.

Na_2HPO_4, no ppt.

By reaction with H_2PtCl_6,
proves the potassium.
also by flame test.

(The platinic chloride solution acts very strongly with the heated residue, metallic platinum seemed to be precipitated.)

2

clear fluid. neutral reaction.

added HCl to strongly acid reaction. clear fluid.

H_2S produces no ppt.

NH_4Cl, NH_4OH $(NH_4)_2S$ produce no ppt.

$(NH_4)_2CO_3$ produces no ppt.

Na_2HPO_4 produces no ppt.

H_2PtCl_6 produces a slight ppt. evaporated to dryness and water added gives large ppt (yellow). Hence K.

3

clear fluid, neutral reaction.

added HCl, intense white curdy ppt.

Either silver, mercury, or lead.

is not lead.

is silver.

#4 clear fluid, neutral reaction

added HCl, no ppt.

H_2S no ppt, after heating

$(NH_4)_2S + NH_4Cl$, NH_4OH, no ppt.

$(NH_4)_2CO_3$ white curdy ppt

after standing over night, a precipitate formed in the HCl solution.

is therefore, either lead, mercurous or silver chloride.

a similar ppt also formed in the tube containing free HCl and H_2S.

(to be determined later)

#5

a clear fluid, very slightly acid reaction.

HCl produces no ppt, even on heating

H_2S produces no ppt

$(NH_4)_2S$ produces a ppt which dissolves on further addition of reagent.

HCl added, precipitated sulphur, and also gray ppt.

collected ppt on filter,
(to be determined later)

#6

a clear fluid, alkaline reaction (very probably solution of an alkali earth metal, or alkali metal)

HCl produces a slight ppt, which dissolved on further addition of HCl. also gave gas like a carbonate added reagent to strongly acid reaction

after evaporating (HCl, to dryness, i.e.) ppt (white, amyloidal) is soluble in water added small amount of HCl.
(before adding HCl, reaction acid).

H_2S produces no ppt.

NH_4Cl, NH_4OH $(NH_4)_2S$ produces a slight gelatinous ppt, which might be sulphur (i.e. sulphur).

$(NH_4)_2CO_3$ produces a ppt
(to be determined later)

7.

a cloudy fluid, very slightly alkaline.

addition of HCl precipitates a heavy ppt.

filtered, to filtrate added, dilute H_2SO_4, slight ppt, appears to be lead.

8.

a clear fluid, acid reaction

addition of HCl produces a heavy ppt, therefore either lead, mercurous mercury, or silver

is not lead.

is mercury. (mercurous)

9:

a clear fluid, neutral reaction.

added HCl, no ppt.

" H_2S, " ppt.

" NH_4Cl, NH_4OH, NH_4OH produced a slight turbidity which did not disappear on gently heating.

$(NH_4)_2S$ produced no ppt.

$(NH_4)_2CO_3$ produced a heavy ppt.

is, therefore, Ba, Sr, or Ca.

is Barium.

10

a turbid fluid, acid reaction.

HCl produces no ppt.

H_2S produces no ppt.

NH_4Cl, added, NH_4OH produces a white ppt.

$(NH_4)_2S$ dissolves the ppt produced by ammonia.

(to be determined later)

analysis of a thick fluid.
acid reaction, clear solution.

HCl produces no ppt.
not silver
lead
mercurous Hg.

H_2S produces no ppt.
no lead
mercuric Hg
Copper
Bismuth
Cadmium
Arsenic
Antimony
tin
gold
platinum
tetrad iron.

$(NH_4)_2S$ produces a heavy white ppt.
with evolution of H_2S gas.
ppt seems to be soluble in solution
to some extent

presence of
Iron
Manganese
nickel
Chromium
Cobalt
Zinc
aluminum.

White soln.
absence of iron,
cobalt
nickel

Qualitative analysis for nickle of sample #21 of Mr. Burns ores.

very small % nickle. little more than a trace.

4 clear fluid.
neutral reaction

HCl, no ppt, no silver, mercurous mercury, no lead chloride.

H_2S no ppt,
no lead sulphide, mercuric mercury, Bismuth, copper, cadmium, tin antimony arsenic, pt, golde

---

Preliminary Examination

is a white powder.
is unaltered at low temp.
" " " high temp
White incrustation on Charcoal
Cline green bead with sodium
meta phosphate, while hot,
colorless on cooling
When fused in large excess with $NaPO_3$, gives an enamel white bead on cooling in the flame,

either magnesium, calcium, lead.
cadmium, or zinc,

#5

a clear fluid, very slightly acid
reaction, evaporated, leaves a white
residue which decrepitates violently —
fused at a red heat,
gives no sublimate in a glass tube
on heating —
While evaporating, emits an odor,
somewhat resembling ammonia.
fused with water phosphate, gives
a clear bead on cooling
On fusing in charcoal flame, solidifies
to an opaque white bead.
Does not color flame when heated
with cobalt nitrate
is not luminous in blowpipe
flame,
is either Barium or aluminum in
appearance to be aluminum.
is Barium.

1 Dec. 10th 1891

a clear colorless fluid.
acid reaction.
HCl no ppt.
H_2S " ppt.
$(NH_4)_2S$ " ppt.
$(NH_4)_2CO_3$ white curdy ppt.

analyze the following substances

✓1 Silver — ores
✓2 Mercury (ous) — rocks
✓3 Lead — earths
4 Mercury (ic)
✓5 Bismuth — Ca, Ba, & Mg. earths
✓6 Copper
✓7 Cadmium
8 tin
✓9 Antimony
10 Arsenic
11 Gold
12 Platinum
13 Nickle
14 Cobalt
15 Iron
16 Manganese
17 Zinc
18 Chromium
19 Aluminum
20 Barium
21 Strontium
22 Calcium
23 Magnesium
24 Potassium
25 Sodium

Analysis of a mineral received Jan 7th 1892 from M. L. Ely, Adair, Iowa, supposed to be platinum ore, for all constituents.

metallic lustre
Gravity
scratches glass,
no streak.
Unaltered in O.F. & R.F. but forms a white incrustation, which may be osk.

With Borax bead, dissolves freely thus bead, in O.F. is a light red while hot, gradually turns darker and, when cold, is a bottle green color (emerald green)
Is unaltered in R.F.
With microcosmic salt, same as with Borax.
With Cobalt nitrate on charcoal in O.F. gives a greenish yellow incrustation,

No. R. 7, gives a very dark, nearly black, incrustation.

Analysis by the wet method.

Partially soluble in HCl, to a yellow green fluid.

H_2S on ppt. solution was a pale yellow precipitate.

4 drops nitric acid oxidized color changed to darker yellowish green.

a light flocculent ppt. formed on addition of ammonia, has a bronzish yellow tint (ferric hydroxide)

ammonium sulphide produces a black ppt.

ppt completely dissolved in dilute HCl.

dilute H_2SO_4 gives no ppt., no lime, strontia, calcia.

Heated some solution with HNO_3 added to a part $K_4Fe(CN)_6$, gave a ppt, which proves the presence of iron.

added $FeCl_2$ to part of HNO_3 solution added Na_2CO_3

no manganese, no zinc, trace aluminum.

Analysis of part insoluble in HCl, treated with nitro hydrochloric acid. H_2S produces a turbidity, which may be sulphur.

Qualitative analysis of a mineral
sent down by Mr. Edison on
Jan 26th 1892.

Color, Black generally, ranging
streak. Black
Luster. metalic
Structure, seems to be lamminated.
Gravity

Dissolves easily in fused borax
on platinum leaf.
While hot, appears red
" cold. " green by transmitted
light
When largely diluted with borax, light
green, very transparent,
contains iron, in large quantity.

not easily soluble in microcosmic
salt.
When hot, appears red, on cooling,
turns a little green, then gradually
turns clear when cold is perfectly
clear. (with small amount of assay).
With large amount of assay, it is
insoluble in bead. ~~of~~ On cooling first
turns a deep green then gradually clear
with the undissolved sample contained
within.
In reducing flame, on cooling turns
a deep red, from color, still insoluble.
When assay is dilute, after heating,
becomes green, gradually becomes nearly
colorless. When cold, a trace of green
color left.
Probably contains, nickel, manganese,
Iron, nickel, cobalt, tantalium, columbium
titanium tungsten, zinc, cadmium, lead, bismuth
antimony.

Not altogether soluble in HCl.
H_2S produces no ppt, even on boiling
color, after boiling off H_2S, is
slightly yellowish.
after addition of nitric acid
color is a yellowish green.
ammonia added gives a ppt. of iron
$(NH_4)_2S$ produces a black ppt, which
contains iron among other possible substances.
ppt collected on filter and treated with
cold dilute HCl dissolves completely with
evolution of H_2S.

no silver, mercury, lead
" bismuth cadmium, copper, gold,
platinum, antimony, tin, tetrad iron
and chromates.
no nickel + cobalt.
no Barium, no Strontium, no calcium.
no manganese, no zinc.

digested some one in Hydrofluric acid & HNO_3,

H_2S produces no ppt,

absence of lead, bismuth, cadmium, copper, mercury, gold, platinum, antimony, tin, & arsenic.

addition of HNO_3 turns it a brown color, by transmitted light, on boiling it turns a greenish yellow color, addition of ammonia produces a heavy ppt.

$(NH_4)_2S$ produces a heavy ppt, filtered and filter dissolved in dilute HCl, sulphur separates, but no residue.

no nickel, no cobalt.

no barium, no calcium, no magnesium

no sodium, potassium, lithium

contains titanium, iron,

Analysis of Swill-ore, for all constituents,

about 1 gram was ~~fused~~ dissolved in hydrofluoric acid, and changed to chlorides by HCl, which ppt. the silica, contains considerable.

H_2S gas passed through a portion of the solution,

Produces a white precipitate, which consists of separated sulphur. (Iron is present as a ferric salt.)

HNO_3 & NH_4OH added, produce a ppt of ferric oxide.

$(NH_4)_2S$ added, heavy ppt, filtered, added dilute HCl, not entirely soluble in it, but leaves a black residue, which is probably nickle and cobalt, (traces)

trace of manganese ~~contains~~ phosphorus

no aluminum " titanium

considerable iron, " " sulphur

Analysis of some hydrated Manganous chloride containing another salt, for Mr. K. L. Hickson

The substance contains a salt, besides the manganous chloride.

a considerable portion of the substance was boiled with H_2O to free it of the salt, the solution filtered and evaporated to small bulk,

The black residue which was insoluble in H_2O was treated with HCl and was insoluble in that.

The solution filtered, & treated with H_2S, no ppt

another portion treated with NH_4Cl, NH_4OH, & then $(NH_4)_2S$

NH_4OH produced a ~~[illegible]~~ brown flocculent ppt, indicating iron.

$(NH_4)_2S$ produced a black ppt.

f. The filtrate from the $(NH_4)_2S$ ppt was boiled with NH_4Cl, $(NH_4)_2CO_3$ + NH_4OH,
a small white ppt was formed, indicates probable presence of Ba, Ca, or Sr.
To a portion of the filtrate, some $(NH_4)_2SO_4$ was added, no ppt.
To another portion of filtrate, some $(NH_4)_2C_2O_4$ was added, no ppt.
The ~~ppt~~ from the $(NH_4)_2CO_3$ ppt was digested in dilute HCl, evaporated, H_2O added, and to a portion of $(NH_4)_2CrO_4$ was added, produced a white curdy ppt, which indicates Barium.

The ppt from $(NH_4)_2S$ contains iron, manganese.
The salt is mixed with the manganous chloride in $BaCl_2$.

Analysis of a solution, containing Iron, Phos. Calcium, H_2SO_4 & possibly some other things.

Solution is clear, with a yellowish tinge.

HCl produces no ppt, but changes color to a yellow green tint, still clear.

H_2S water produces a ppt. sol. in $(NH_4)_2S$ X

HNO_3 & NH_4OH added to a fresh portion ~~and~~ NH_4OH produced a ppt, which indicates iron.

$(NH_4)_2S$ produces a black ppt.

50 c.c = 20 grams iron to be analyzed for Al.

Weight of platinum crucible 22.920

Weight of crucible, ash & filter & residue, 23.0524 grams.
22.920
0.1324 " diff
ash 0.0007
0.1317 weight of Al_2O_3

Contain 53.4 % al.

= 0.66 % Al_2O_3 in Ogden Ore.
= 14.8 lbs per ton.
= 35.2 lbs $Al_2(SO_4)^2$
= 20.4 " H_2SO_4

Total amount of acid consumed by the Al_2O_3 & Fe is 29.6 lbs.

Contains P. Considerable
Fe Considerable
Ca fair
Ti trace
Al. fair
As. trace

Contains H_2SO_4

Qualitative analysis of mineral
given me by Mr. Edson

Ores sol in HCl

H_2S produces a brn ppt which on
digesting a portion in $NH_4)_2S_x$
does not give clear white filtrate
but a cloudy turbidity
decided white ppt with $(NH_4)_2S_x$
deposits insoluble residue in
dilute HNO_3
is a complete solution;
The portion sol in $(NH_4)_2S_x$ on boiling
with HCl, gives a brn ppt.
On addition of NH_4OH to solution in HNO_3
a blue coloration is produced.
indicates Cu.
On heating gently, appt comes down
which redissolves in sol of KCNS.
ppt from $NH_4)_2S_x$ is completely sol in
Na_2S.

Filtrate was boiled to drive off
H_2S gas, added NH_4Cl + NH_4OH.
NH_4OH produced a bulky iron ppt
which was of the green modification
added $(NH_4)_2S$ solution, gave a black ppt
in a compound sol in dilute HCl

On adding KCN to copper flux
a red [illegible] appeared, indicating Cu
[illegible]
arsenic
copper
nickel
aluminum
cobalt
iron
[illegible] of [illegible] which seemed to
indicate [illegible] gold or platinum.

77.6
5.8
2.58
1.548
1.290
24.444
1.222.4
1.2%

Standardization of Cupric ferro
Cyanide Solution

10 cc used.

6.2 − 7.4 = 1.2 cc = 10
cc cupric ferro Cyanide

Standardization of KCN for
Ni.

1/2 gm Nickel Ammonium used,
contains 38.46% Ni.

192.3 mg Ni

18.2 50.8 = 32.6 / 1.2 31.4 = 192.3 mg. Ni

31.4) 192.3000 (6.12.4
188.41XX
390
314
760
628
1320
1256

1cc = 6.12 mg Ni

Analysis of a sample of Burns Ore, found at Upper High Bridge, track on
has blue streaks in an otherwise light grey rock.
Burns thinks Blue is due to colorty

A solution of it in H cl, was given to me by Mr Edison, for Qualitative tests. The solution was diluted & treated with H_2S, which separated white sulphur. Indicates Fe in 'ic' condition.
Solution filtered, & boiled to expel H_2S, & treated with NH_4Cl & NH_4OH

Analysis of a sample of Burns's ore, found at Upper track at High-Bridge, has blue streaks in it, remainder is whitish grey color,
Burns thinks Blue is due to colorty

Ore digested in HCl.
residue after evaporating, was digested in H cl, & evaporated to dryness, to render silica insoluble.
Then redissolved in H cl, with large ex of H_2O, & treated with H_2S produced a separation of sulphur, & a dark ppt.
which is sol. in $(NH_4)_2S_x$.
To remove any Cu that may be present, ppt is boiled with Na_2S solution,

On during H_2S from filtrate
+ adding NH_4Cl, + NH_4OH, the
NH_4Cl NH_3 ppt of alumina, instead of
iron, as usual.
After a while, a little iron came down
The $(NH_4)_2S$ ppt was nearly soluble in
dilute HCl, leaving only a slight
residue. It contains Ni or Co, or both
The filtrate, having the dissolved sulfides
neutralized by 2x H_2S, + a portion
treated with H_2SO_4 produced no
ppt, no Barium + Strontium
a larger portion treated with HNO_3
boiled, + tested for Barium salts.
Contains Iron - does not contain
no zinc - Chromium -

000156

Analysis of a sample of reference
Pyrrhotite received from Mr E.
Its digestion in HCl aftwards
changed to a chloride
H_2S produced a turbidity, & also
a deposition of sulphur.
Evaporated off H_2S, added NH_4OH & NH_4Cl
The NH_4OH produced a ppt
added $(NH_4)_2S$:
ppt dissolved in HCl left a black
residue, which was dissolved in
aqua regia, to get rid of sulphur,
and reprecipitated.
The solution had H_2S driven off,
& was tested
contains fe, mg, ~~trace~~, al, mn, ~~mn~~ Co
H_2SO_4 gave no ppt of Ba, Sr, or Ca
Contains ~~trace~~ al
" " Cr

The H_2S ppt was redissolved in $(NH_4)_2S$ with
addition of sulphur.
Contains
iron much
nickel
cobalt } about 5%
manganese, small
magnesia
alumina
trace of one of copper groups

determination of Au of 5 - 15 cm
[illegible] reduced by H_2O_2 after
incineration.

Weight of Pt. crucible 22.8434
22.8645
22.8440
3) 205
41 mg

1 - 15 cm paper, ash = 4 mg

$BaCl_2$ KCn

$2KCn + BaCl_2$

$= 2KCl + Ba(CN)_2$

130) 207 (1.6
130
770
780

130) 390 (1.8
130
130
130

$Au(Cn)_3$

2 grams gold hydrolyzed = 3.8

90.0

KCn 3 - NOH

26
52
65
2
130

137
35
31
207

203

[illegible] dollars =

[illegible] 50% at [illegible]

$[illegible] cts [illegible] cts for dollar of [illegible]

materials.

for [illegible] dollars for [illegible] 3 cts for [illegible]

[illegible] for 10 dollars.

Oxalate of Cobalt

$C_2Co'O_4 + 2H_2O$

24 59 64 36

64

36

59

183

59) 183.000 (3.1
177
6 0
5 9
1

183) 5900.000 (32.24
549
410
366
440
366
740
732

= 32.24% Co

Oxalate of Nickel

$C_2Ni'O_4 + 2H_2O$

24 59 64 36

183) 5900.000 (

32.24% Ni

250 milligrams diluted to 250 cc.

125 cc. for test

4.03 mg = 10.6 cc

Assay of a material received from F. Wagner of Ch. Phen & Dist., which is used as a substitute for Borax in Pickling.

I.D.S. white powder, resembling Borax

Sol. in H_2O slowly in cold, in H_2O at boil but in dissolving strong effervescence. On addition of HCl, produces no ppt.

H_2S produces no ppt.

pH = 9.4 to H_2S, boil, no solution, probably a trace of iron salts.

(When the powder is heated in a test tube, this will complicate instance)

(flame reaction indicates Na).

No Ba. trace SO_4

No Ca gives very strong reaction with

No Sr $O_2(NO)_2$ indicates grossness Ca.

" Mg

" K is cyanide of Sodium

" Li

23.8 34.4
34.4 45.2

10.6 10.8

10.6 cc of permanganate sol. = 4.03 milligrams of Fe in Fe C_2O_4

1 cc = 0.38 milligram or 0.00038 gm

29.6
70.4

40.8

57 .9990
.1998 grams

40.8) 0.1998000 (4.897
163214
3660
3264
3960
3672
2880
2856

1cc = 4.897 mgm

1 Cu

5 gram ore / 100 cc.
100 cc used in each test

43.4 cc
1.25 %
2.0.627 = 60.7 = 12.5% cu

2 5 gram Cu

2 Cu 44 = 110 cu

✓ 5 gram
2.3.8
56.4 110 cu.

4 – 5 gram

45.1 98.2 = 7.2 = 24.1
24.1 = 84 = 6000 = 6.2% cu

5

6.5 = 23.8 = 23.3 = 2.4% cu

✓ 6 – 1.25
24.2 83.0 = 58.8
= 12.2% cu

7 – 1.25
3.3 48.9 = 45.6
9.4% Cu

8.
110 cu

1 cu 11.383 585 = 200

2 cu 11.7267

6. Roaster
2 grams used

7 2 grams used

8 2 grams used
64.200 No Cu

9 5 grams used.

10 Roaster 5 grams used

11 5 grams used
Certificate (Co)

12 5 grams used

13 5 grams used.

Weights of Pt. Strips

~~# 2 - 43.0~~

~~# 4 - 31.5~~

~~# 6 - 30.00~~

~~# 8 - 35.00 mg.~~

~~# 10 - 37.75 mg.~~

1 - 11.325 - 11.337 = 9

2 - 13.1595 - 13.168 = 10

3 - 12.984 - 13.000 = 11

4 - 11.337

1680
15950
98

337
325
1.2 mg. 16
78.7
1574
787
10.44.4

78.7
4722
787
9.787
12.59.2
.63

Cu.

7.63.2 . 75.0 = 86.45 mg.

10 45.5 . 63.2 = 69.68 mg.

11 84.8 . 86.3 = 87.67 mg.

12 37.4 x 45.5 = 32.0 mg.

13

2.3.22
3.484
15

4(997

42 77.1 - 29.37.4

42
554
8.4
6315

29
8.1
11.8 3.937
31496
3937
2.9537
46.45.66

9.6.3
8.6.8
11.5
258
1270
258
2.5.6.70

11.336

(3.500 - 250 mg. Cu.

63.5) 250.0000 (3.93
190.5
59.50
3715
2350
190.5
4650

8.1
3.9377
3937
31496
3.48.8.97

1.7.7
3.937
27559
27559
339.37
6.9.6.8.49

Experiment on analysis of Ni.
by Colby Uniform Hydrate method.
solution of decidedly clear solution
H solution = 500 cc + 250 cc [illegible]
Ni obtained [illegible] of Ni by Colby method
5000 cc

12

# 12 5000 cc
105 = 3750 cc
75

570 : 2 [illegible]

570) 750,000 (1389 grams
570
2100
1620
4800
6320
4800

= 1.389 grams

14 2 grams = 2.94 %

37.5 cc – 1500 cc
225 cc

375) 22500.00 (

34.7 × 2.0 = 7.3 cc
225 : 375 :: 28.74 : x
3.937
11811
27559
28440 milligrams

1.200 grams

800 grams = 1500 cc

6.6 : 8 : x : 1.00

8) 66.00 (8.25
60
40

22800
8967
8.7 mg
2.2
6.6 g

15 2 grams = 1

415 - 140cc

275 cc | 415 | x 2

Cu for 275 cc
90.6 - 98.9
2.4 34.7
2.4
275 cc = 12.06 % Cu
3 2 3
40.6 cc
22.909

Pt. Crucible
22.8520
22.9055
.0535 mg.
4
.0495 mg.

= 2.3 % Nitrogen
.06

Cu Iron
6 51 %
8 7 %

Ni
22.883
22.894
11
7

16 2 grams

470 - 120cc
120
350

45.4
0.8
54.4 cc
.937
15.748
17.685
3937
60.62.98 mls.

= 4.07 % Cu

22.862
22.8865
.0245 mg
6
205 mg = 21

= 1.4 %

Iron

17 2 grain

425 - 75 cc

350 cc

60.8
60.8
50 cc
3.04
31784
19865
2.3.0434 mil

= 1.49% cu.

ni. for 1 350 cc

= 0.40% Ni + Co

Weight of residue = 8.5 mg. for 350 cc

0.52

cu Iron Ni

22.8895

18 2 grain

315 - 115 cc

200 cc

66.4
94.5
7.17 cu = 5.55% cu.
.937
35.438
5.559
.937
3.4712 3 milligr.

22.8895
22.8845
15.5
u
11.5 mg. nickel

0.81

Iron

19.

2 5 cc.

415 - 105 = 310 cc.

= 149 x mg. = 9.8% Cu.

22.877
22.893

016

1.2 mg = residue

0.8%

Solution of CP Electrolytic Copper for standardizing N/10 solution

Weight of Cu 0.7825 grams dissolved in HNO_3, diluted to 7825 c.c.

Water Analysis for Mr. [illegible]

Determination of Solids

Dish & residue 101.943 grams

Water & dish 253.500 "

Water by diff. = 151.557 grams.

Evaporated & dried at 100°C

Residue & dish weigh 101.950 grams

Residue weighs 0.007 grams =

0.00462 % by weight of total solids =

Total quantity of solids per gallon = 2.69 grains.

Water has a straw-yellow color which is due to suspended matter, the majority removed by filteration.

has a disagreeable taste

has a slight acid reaction

200 cc for cl = 4 milli cl.

200 cc " H_2SO_4

250 cc " Ca & Mg. no S.

One american gallon = 8.33888 22 lbs

1 lb. avoir = 7000 grains

1 gallon therefor has 58372.1754 grains.

50 mil NaCl = 39.32 % Na (meaning) =

60.68 % Cl.

28.000 cc $AgNO_3$

59.4

21.4 cc =

1 cc = 14.45 milligm Cl.

10 cc + 90 cc H_2O =

1 cc = 1.445 mill. Cl.

$$\begin{array}{r} 59.8 \\ 59.6 \\ \hline 2.8 = \end{array} \qquad \begin{array}{r} 2.8 \\ \hline 11560 \\ 2890 \\ \hline 4046.0 \end{array} = 4 \text{ mill. Cl}$$

$$60.68 \,\big)\, 4046.000 \,(0.06$$
$$\begin{array}{r} 36408 \\ \hline 40520 \\ 36408 \\ \hline 41120 \\ 36408 \end{array}$$

No initiation

Contains 1.94 grams Na Cl per gal.

" 1.05 " suspended matter per gal.

Is potable after filteration.

Contains 39 milligrams of Ca + Mg carbonate per liter =

Contains 5 grams per gallon of Ca + Mg. carbonate

Weight of pt Crucible

22.839 grams.

10 filter papers incinerated.

8485 — 40, 16

8390 — 12, 32

0.095

Weight of crucible & incinerated Ca + Mg ppt

22.8405 — 6.66 / 5

22.8465 — 0.1.5.4

.6 mg

1/5 mg of Ca O + Mg O

51 × 40 : 92 — 9.7

35

(48) 460 (9.7) — 38.8

432

280

.101 7000
.059 2.
.10
1.4
1 3.4

1 liter milk, 15 400 grams
1 " " 1 000 000 mil. gm

1 mg. = 0.0154 grams
39
1386
462
.6006 grams per liter
8.3388822
6006
2.2
50.0332932
300332932 00
5.0083,3,24,49,32

pl circle 22.8465
22.8550
0085 mg
.425
2125
3400
425 : 350 : .85
350) 3.125 (103.2
350
1125
1050
750
10.32 mg
10.32) 2000.00 (193.8
1032
9680
9288
3920
3096
8240
6
0052
78
416
364
.4056

193.8) 100.0000 (.516
96900
3100
1938
1620

Experiments on new method of [illegible] Ni.

In 50 c.c. Pure Nickel Anode is dissolved in HCl & ferric [illegible] added [illegible] & [illegible] added.

Experiments on new method of nickel determination by Thomas Moore
in Chemical News Vol 59. 1889-1. Page 292 1. June 21. 21

Cobalt is not determined with it, & should be removed first.
Copper must also be removed. A measured amount of the slightly acid HCl solution, a solution of Sodium pyrophosphate is added until precipitate ceases to form, & then a slight excess is added, (the acid till ppt is redissolved, but I have been mistaken to redissolve the ppt, even on adding 1 quart of solution of sodium pyrophosphate, to about 100 c.c. of HCl solution.) Ammonia is then added drop by drop, till the ppt. dissolves, & excess added to render the solution blue, a measured quantity of ferric ferro cyanide is then added, which is equivalent to a known number of c.c. of cyanide solution

+ The solution of Potassium cyanide
[illegible] standardized, [illegible]
added. Till the yellow color is [illegible]
If it is [illegible] in a ~~[illegible]~~ [illegible]
drop, the last drop can be caught at
the right time.

Experiments of Pfiff: of Cobalt
H 1.
Page 151 - Special method
Chem. Analysis by M. A. Jewell
~~Solution for Ni determination used~~
Ammonia added.

12 2 grains

14 2 gm

20°° cu S.U.

63.4

Cuadr. mayor 22.888

15 2 grams

20cc Cu Sub. 21cc KCN.

5 grams

20 2 grams

When HCl was poured on roasted ore, gas off a gas, like a carbo. etc.

50.8 55.2 = 3.2 cc for Cu of 5 gms =

50.8

4.4

= 0.3134% Cu 1.2

3.2

4.897

3.2

9794

14691

15.670.4 mg cu in 5 grams

3 grams

390 — 2.15

Weight Crucible 22.858

22.8707

13 10 mg

1.5 3906

7.5 50/754

1.0 1.25

21 3 grams / 7 grams

55.34 7.6 64.9 - 92.3

12.3 4.897 64.9

13.7 28.0 27.4

1.4 39176 1.4

= 2.82% Cu 39176 28.8 cc

9994

141.0336 mg Cu in 5 grams

0.8% Mic

320 cc - 150 cc

22.8707

1.29075

30x0

107

6.70

37

4 | 33

8

3

4 hy

22 5 grams / 2 grams

3 grams

340 cc 150 cc

2 grams Cu 9.7 cc

27.7

22 c.c.

4.897

9794

9794

10.7934 mi Cu

120 : 10.8 :: 100 : x

20 / 1080 (.5%

23 5 grams
2 grams

3 grams

24 5 grams
~~2~~ grams

19.8 - 56.4 = 22.6
41.2 = 3.07 %

31.4 cc = 3 grams

465 cc - 3 grams
220 = 245 cc remained

22.9075
22.910

2.5 mg -

3000
30/250

30 100 245
26 12250

465 : 5000 245 : x
5000

465) 1225000 (2634
930
2950
2790
1600
1395
2050
1860

131 1 gram

Cu orig - 56.4 - 62.8 = 6.4

1 gram 4.897 1.12

5.2

9794

= 2.54 % Cu 24485

25.46 44

5 grams Dupal for pt

.7

2 gram

22.9105
22.9182

7.4 mg.

20) 77000 (3.85
60
170
160
10

8

2 gm

30.6
39
1.4
1.2
7.2

4.897
7.2
9.784
34279
35.25.94

20) 35.2594 (1.76.29 % cu
20
15.2
14.0
1.25
1.20
.57
1.74

12

2 gm

.34% M

22.9182

22.925

20) 6.8000 (.34

60

6.8 mg

15

2 gm

22.925

22.9305

.275% M

5.5 mg

50/5.5000

.275

22

2 gm

5 - mg - diff

2[illegible]) 5.0[illegible] 12 s 24[illegible]

23

2 gm

Cu. 41.5 × 8.97

53.5 108

120 391 86

1.2 48970

10.8 528886

(2.0 x) 52.8886 (26.4443

40

128

120

8

10.44

(0.0950) 1.0000000000 (10.44

95 58 1.1.1.1.1.1.1.1.1

04200

3.8032

3.8 gm

10.44 g

3 12.48 gm

6.96

.037296 gm H per amp/hr

22.8850

22.8853

20) 53 cm (2.65

40

130

no ppt in adding $(NH_4)_2S$

no ppt in adding ammonium acetate

ammonium